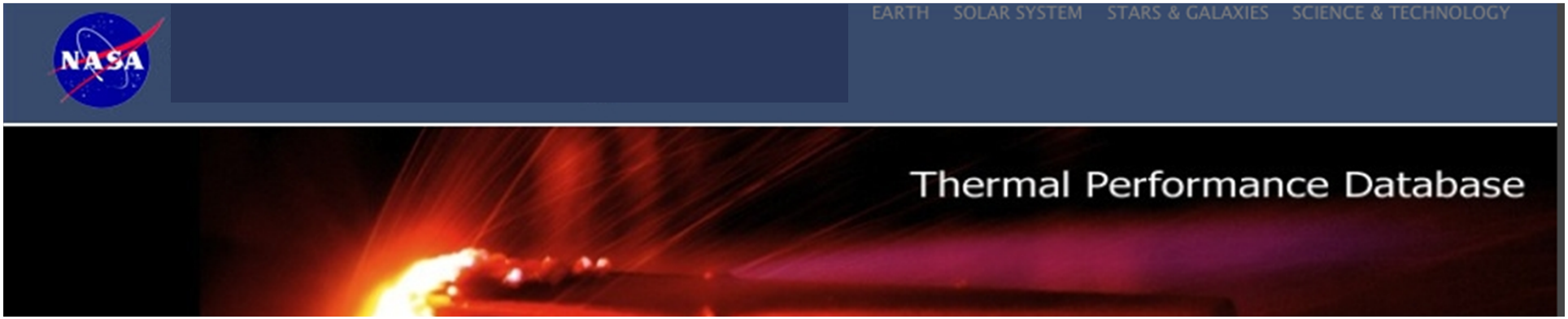

Thermal Performance Database
NESC Assessment 09-00565

4th AF/SNL/NASA Ablation Workshop

March 3, 2011

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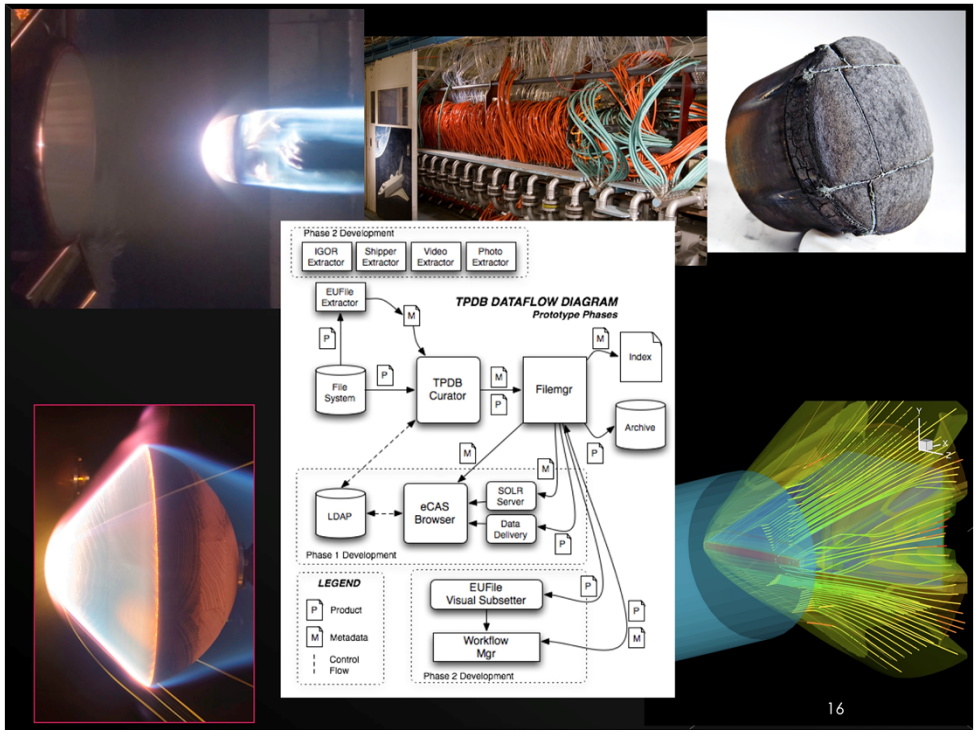
NESC Thermal Performance Database

- Why a Thermal Performance Database (TPDB)
- What is TPDB
- Current Status
- Plan Forward
- Acknowledgements
- Short Demonstration



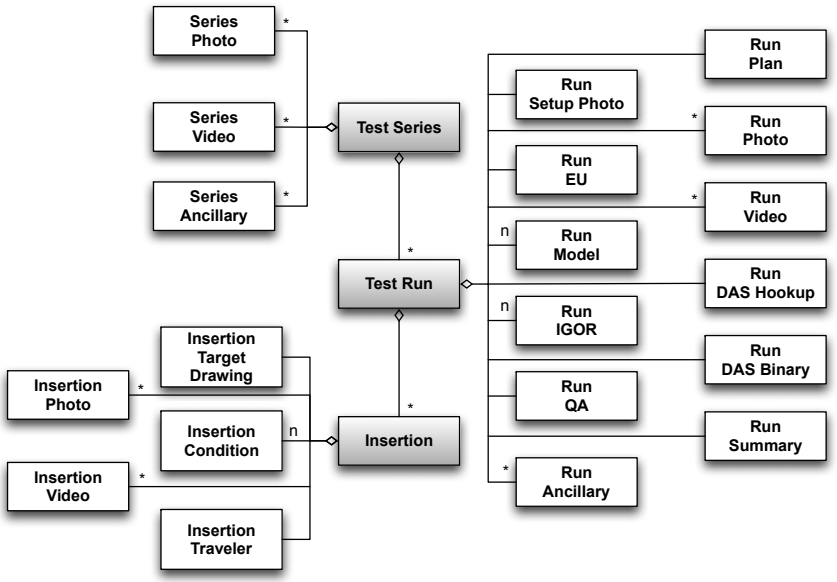
http://tpdb.jpl.nasa.gov

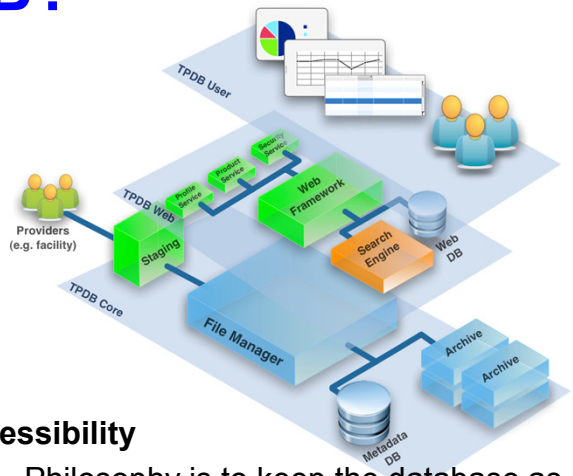
Thermal Performance Database (TPDB) – Motivation

- **CEV TPS ADP System Down Select evidenced data management issues**
  - There is presently no data central repository for thermal performance data acquired either in test facilities or by analysis
- **Time consuming to collect data**
  - Performing thermal response analysis and comparing measurements to analytical predictions requires a rigorous, related dataset with validated attributes
  - Collecting a complete set of data for a single test is a time-consuming and error prone process since much of the data is manually entered, burdening test PIs and analysts to validate the data later
  - Data, even for a single test, typically reside in multiple locations
- **Data rot – increasingly losing critical thermal performance data with time**
  - Loss or corruption of any one of multiple data sources can reduce or even eliminate the value of the test for future applications
  - Probability of loss increases with time as projects proceed, are cancelled, PIs change functions or leave the Agency

What is TPDB?

- **Web-based collection of thermal performance data**
  - Calibration lab and instrumentation data
  - Thermal test calibration results
  - Material response test results
  - Computation fluid dynamics – arc jet simulation
  - Thermal response analysis results
- **Functionality**
  - Accept data from facility test engineers, PIs, thermal, and CFD analysts
  - Extract specified data for general analysis purposes
  - Search and report on holdings based on user-criteria

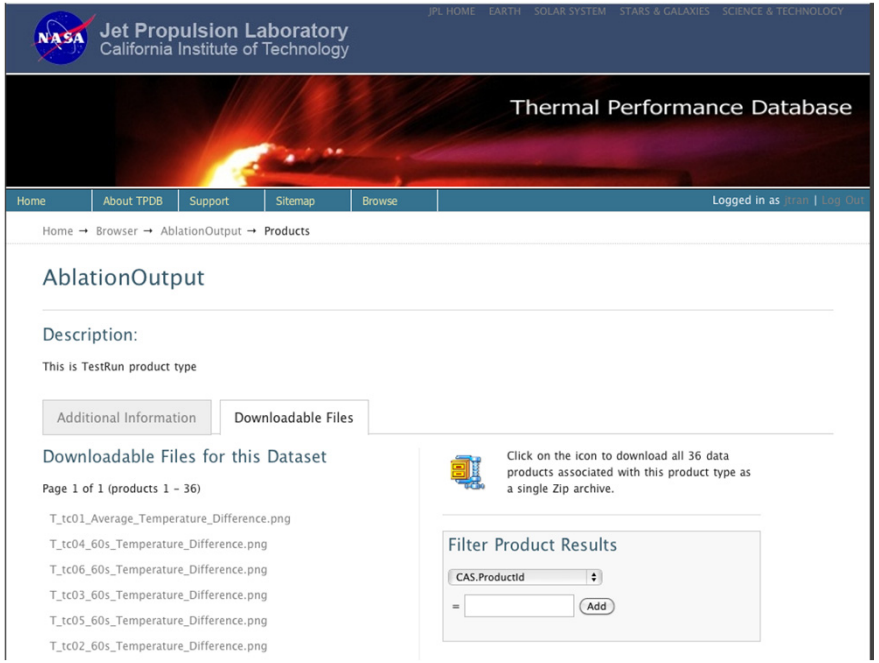


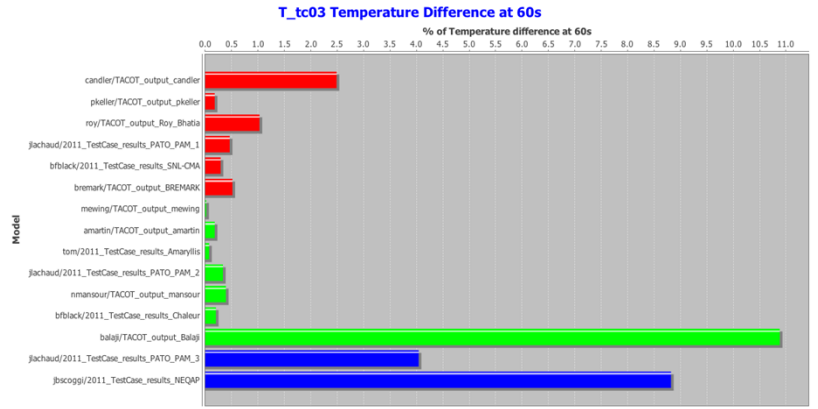


- **Accessibility**
  - Philosophy is to keep the database as open as possible, encourage international, University, Industry, DoD, and DoE collaborations
  - Controls for ITAR and proprietary data to be stored with appropriate security
  - Operational concept provides project-specific access rights
- **Working tool for the TPS Community**
  - Data management tool for current projects to store and disseminate data
  - Facilitate test planning and interaction of key members of the test and analysis team
  - Facilitate better understanding of test facilities and advertise capabilities – facility operating envelopes
  - Collaborative environment for research and a community for exchanging information

Current Status of TPDB

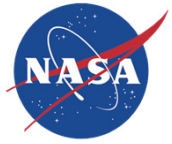
- **Small team implementing serial Builds of the database software**
  - Build 0 – Developed for the Ablation Workshop to facilitate Intercalibration exercise, get out beyond firewall, security protocol, preliminary data model with representative CEV data
  - Build 1 – Core set of functionality including calibration lab and facility test engineering support, basic interface for the principal investigator, full ingestion of CEV and MSL data
  - Build 2 – CFD support, including post-processors so only input decks and raw output results need be uploaded
  - Build 3 – Thermal response analysis support
- **Each Build requires interaction with the community to validate the implementation and provide feedback for re-work**
- **Serial deployments of operational database at ARC in parallel with the development**
- **Historical data collection activity**
  - CEV and MSL datasets fully collected, working on ingestion
  - Orbiter dataset collection ramping up





Next Steps and Acknowledgements

- **System Test and Build 1 deployment scheduled for ~June 2011**
  - Utilize facility characterization test runs to smoke test the Build 1 core functionality and allow us to get live feedback from the individuals who will interact with the database the most, the calibration lab and facility test engineers
  - Interaction with key principal investigators system test to get feedback on PI interface and capabilities
- **Repeat collaborative review and rework cycle with the CFD and thermal response communities as Build 2 and 3 are deployed**
  - **SIGN UP TO BE A BETA-TESTER at http://tpdb.jpl.nasa.gov**
- **Historical data collection ongoing**
  - If you have data, let us know!
- **Acknowledgements**
  - 4th AF/SNL/NASA Ablation Workshop
  - Software development team
  - NASA Engineering Safety Center
  - Crew Exploration Vehicle Thermal Protection System Advanced Development Project
  - Future supporters and collaborators; we need community support to continue the development, operations, and management after the disengagement of NESC and make TPDB a working tool for the ablation community



TPDB Demonstration